Electronic Services - Los Angeles
M102821



# TYPE KM55A OR WM55A RECORDER AND KM53A OR WM53A INDICATOR

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**WARNING**

DO NOT INSTALL, MAINTAIN OR OPERATE THIS EQUIPMENT WITHOUT READING, UNDERSTANDING AND FOLLOWING PROPER Bailey Babcock & Wilcox INSTRUCTIONS AND MANUALS, OTHERWISE INJURY OR DAMAGE MAY RESULT.

## CROSS REFERENCES

| Instrument or Equipment | Instruction Section |
|---|---|
| Class 8A, 8B, & 8C Pneumatic Receivers | P12-2 |
| Class 8D, 81, 82, & 84 Direct Pressure Receivers | M41-9 |
| Class 2H Direct Connected Pressure Element | M41-5 |
| Class 2A Pressure Element | M41-6 |
| Class 4M Temperature Measuring System | M51-5 |
| Class A Pilotrol | P99-4 |
| Class PA, PB, and PC Pneumatic Transmitter | P92-27 |
| Class Y Integrator | G92-1 |
| Class B1 and B2 Telemeter Receivers (AC Voltage Balance Circuit) | E12-16 |
| Class B3, B4, and B5 Flow Receivers (AC Voltage Balance Circuit) | E12-17 |
| Class BL and BN Telemeter Receivers (AC Voltage Balance Circuit) | E12-73 |
| Class E1 and E2 Telemeter Receivers (DC Potentiometer Circuit) | E12-22 |
| Class E3 and E4 Temperature Receivers (DC Potentiometer Circuit) | E51-32 |
| Class E7 and E8 Telemeter Receivers (DC Potentiometer Circuit) | E12-24 |
| Class EA and EB Telemeter Receivers (DC Potentiometer Circuit) | E12-77 |
| Class EF and EG Temperature Receivers (DC Potentiometer Circuit) | E12-78 |
| Class G1 and G2 Smoke Density Receivers | E66-4 |
| Class G3, G5, and G6 Gas Analysis Receivers | E65-12 |
| Class G4 Gas Analysis Receiver (Factory Mutual Approved) | E65-13 |
| Class G7 Temperature Receiver | E12-28 |
| Class G8 Electric Receiver (For OD10 Gas Analyzer) | E65-4 |
| Class G9 Temperature Receiver (For Type UR Radiation Bolometer) | E51-73 |
| Class GC, GD, and GE Gas Analysis Receivers | E65-17 |
| Class GF Gas Analysis Receiver | E65-18 |
| Class GG Electric Receiver (For OD10 Gas Analyzer) | E65-14 |
| Class GL and GN Smoke Density Receivers | E66-8 |
| Class GR Temperature Receiver (For UR Radiation Bolometer) | E51-74 |
| Class H1, H2, and H3 AC Potentiometer Receivers (Computer Functions) | E12-66 |
| Class H4 Electric Receiver (For Hays Magnetic Flow Meter) | E12-67 |
| Class HA, HB, and HC Electric Receivers (Computer Functions) | E12-75 |
| Class J1 and J2 Telemeter Receivers (AC Voltage Ratio Circuit) | E12-13 |
| Class JL and JN Telemeter Receivers (AC Voltage Ratio Circuit) | E12-19 |
| Class L1, L2, L3, L4, L5, and L6 Electrolytic Conductivity Receivers | E67-2 |
| Class LA, LB, LC, LF, LG, and LH Electrolytic Conductivity Receivers | E64-1 |
| Class QA, QB, and QC Temperature Receivers (AC Wheatstone Bridge) | E51-3 |
| Class QN, QQ, and QW Temperature Receivers (AC Wheatstone Bridge) | E51-4 |
| Class QD and QE Electric Receiver (AC Wheatstone Bridge) | E12-26 |
| Class QF and QV Telemeter Receiver (AC Wheatstone Bridge) | E12-76 |
| Class TA Program Controller | E99-71 |
| Class TB Running Time Recorder | E26-2 |
| Class W1 and W2 Electric Retransmitter (AC Output) | E99-81 |
| Class W5, W6, and W7 Electric Retransmitter (DC Output) | E12-6 |

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# Instruction Revision Sheet

This Instruction Revision applies to the Type WM5□A Recorder/Indicator and must be used with Product Instruction E12-3.

Replace the section titled "Power Supply Connections" under "Installation" on page 6 with the following section.

POWER SUPPLY CONNECTIONS

Make certain that supply voltage and frequency is correct for Recorder or Indicator supplied (see "Explanation of Nomenclature").

Make power connections to terminal block inside protecting cover on back of case (Type KM5□A, Figure 1, rear view), or to center terminal block in wiring channel on back of case (Type WM5□A, Figure 2, rear view).

The power supply "neutral conductor" is connected to the "N" terminal of the power supply terminal block. To assure operator safety and electrical code installation compliance, the WM5□A Recorder/Indicator must be "effectively grounded". The equipment grounding conductor is connected to the green grounding screw provided in the wiring channel below the power supply terminal block.

Form IS-E12-3 Litho in U.S.A. 1079
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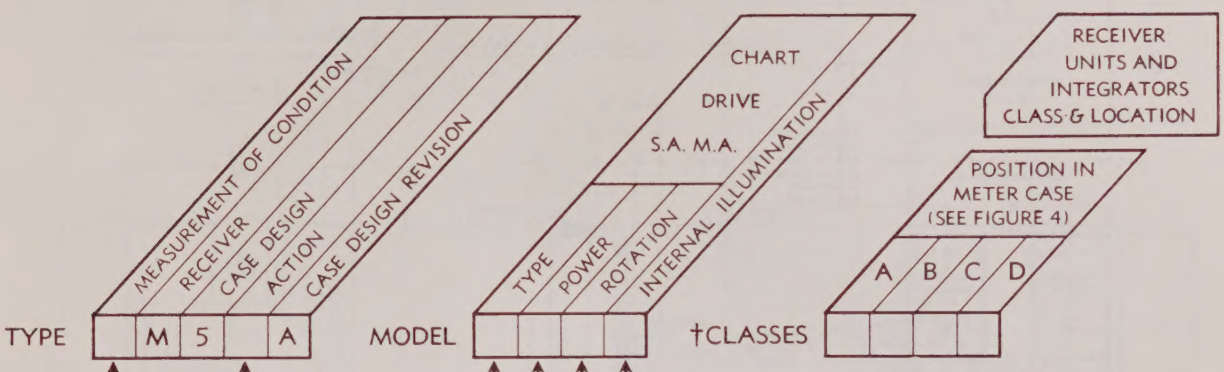
# EXPLANATION OF NOMENCLATURE




3 Indicator *
5 Indicator & Recorder

K - Pneumatic
W - Electrical

E - Electric
M - Mechanical
P - Pneumatic

† See specific Instruction Section for Class Nomenclature.

| | Elec. | Mech. | Pneu. |
|---|---|---|---|
| 1 | 115v60c | Spring | Air Motor |
| 2 | 115v50c | - | - |
| 3 | 115v25c* | - | - |

| Elec. | M | P | Rotation |
|---|---|---|---|
| 0 | 0 | 0 | 24 hours |
| 1 | 1 | 1 | 12 hours |
| 2 | 2 | 2 | 8 hours |
| 3 | 3 | 3 | 48 hours |
| 4 | - | - | 4 minutes |
| 5 | - | - | 24 minutes |
| 6 | - | - | 96 minutes |
| 7 | 7 | 7 | 7 days |
| - | 8 | - | 96 min/24 hr |
| - | 9 | - | 24 hr/7 days |

0 - No Illumination
1 - Fluorescent Ill. 115v 50 or 60c

* All Type □M53A Units are Model N110 or N111. Digits N11 signify "no chart drive"; the last digit is internal illumination.

An "X" in any Nomenclature position indicates that in that respect the Recorder or Indicator is special. An "X" as a suffix to the Nomenclature indicates that the instrument includes some special features not covered by the Nomenclature.

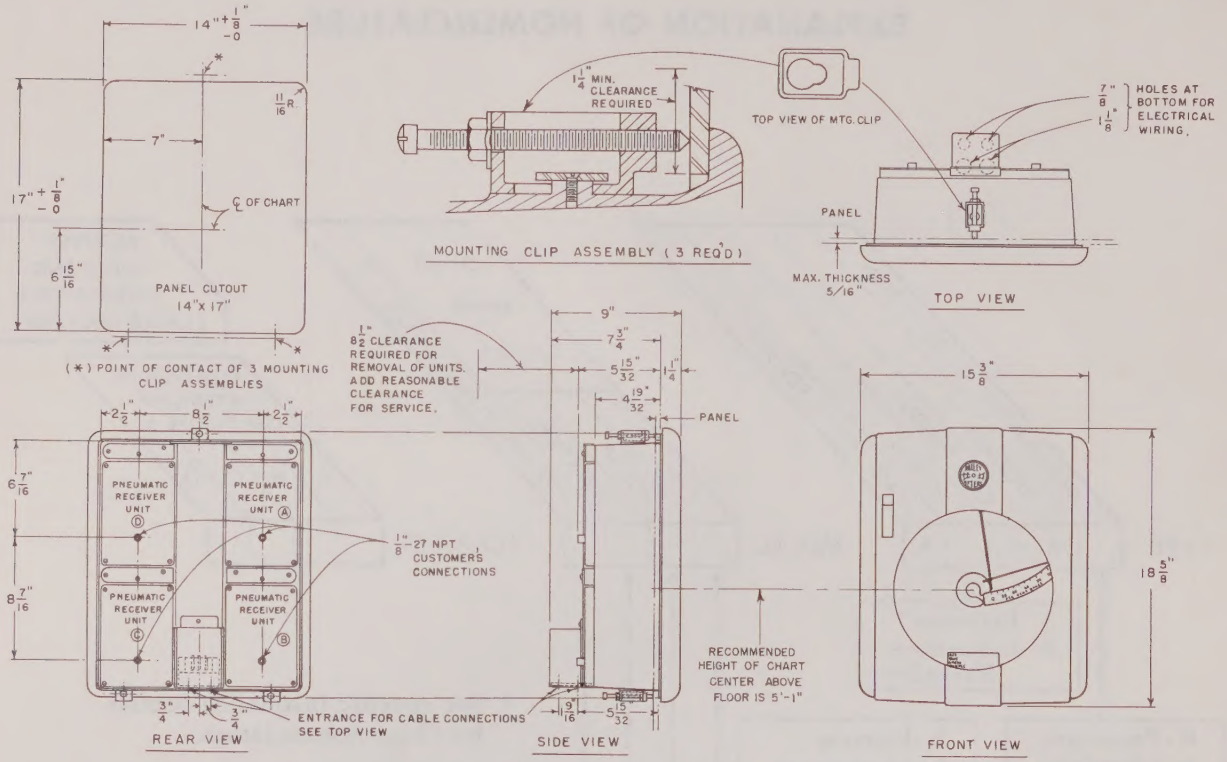

PANEL CUTOUT
14"x17"
(*) POINT OF CONTACT OF 3 MOUNTING CLIP ASSEMBLIES
MOUNTING CLIP ASSEMBLY (3 REQ'D)
TOP VIEW OF MTG. CLIP
HOLES AT BOTTOM FOR ELECTRICAL WIRING.
PANEL
MAX. THICKNESS 5/16"
TOP VIEW
8½ CLEARANCE REQUIRED FOR REMOVAL OF UNITS. ADD REASONABLE CLEARANCE FOR SERVICE.
PANEL
PNEUMATIC RECEIVER UNIT
1"-27 NPT CUSTOMERS CONNECTIONS
ENTRANCE FOR CABLE CONNECTIONS SEE TOP VIEW
REAR VIEW
SIDE VIEW
RECOMMENDED HEIGHT OF CHART CENTER ABOVE FLOOR IS 5'-1"
FRONT VIEW

FIGURE 1 - Case Dimensions and Panel Mounting Dimensions, Type KM55A Recorder (or KM53A Indicator)

| WM CASE DIMENSIONS | A | B | C |
|---|---|---|---|
| AC UNITS (VAC. TUBE) | 6 19/32" | 11 3/16" | 12 7/16" |
| AC UNITS (SOLID STATE) | 10 1/4" | 14 13/16" | 16 1/16" |
| DC UNITS (VAC. TUBE OR SOLID STATE) | | | |
| PNEUMATIC UNITS | 7/8" | 5 15/32" | 6 23/32" |

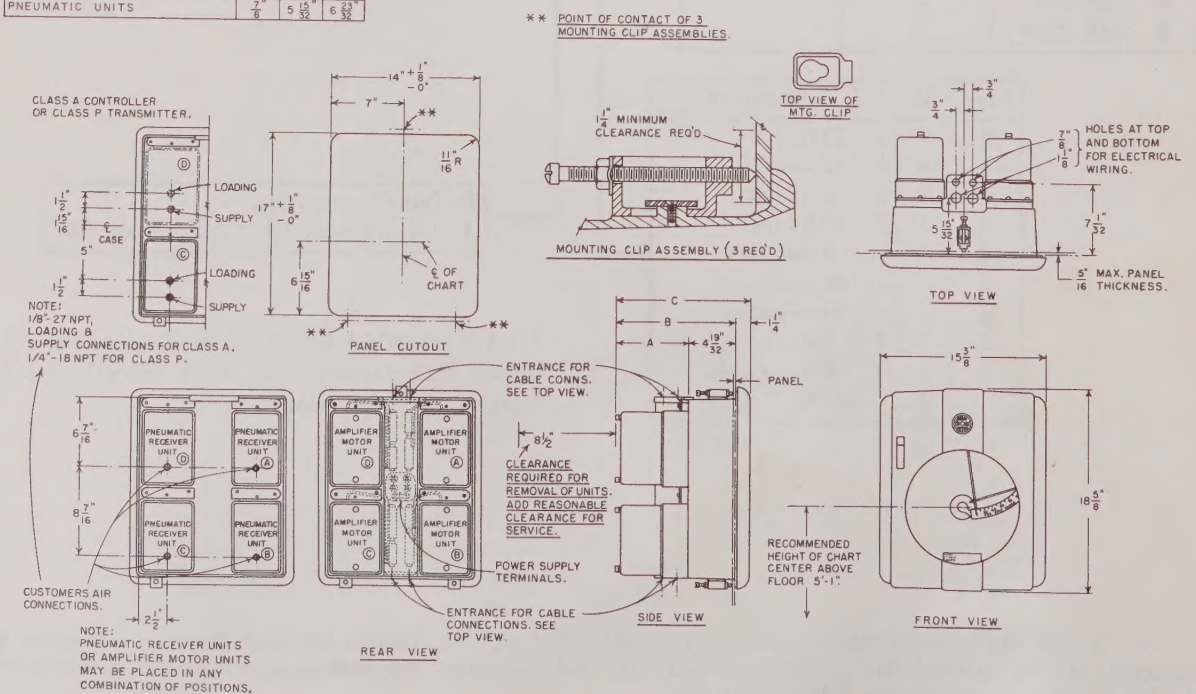

** POINT OF CONTACT OF 3 MOUNTING CLIP ASSEMBLIES.
CLASS A CONTROLLER OR CLASS P TRANSMITTER.
LOADING
SUPPLY
LOADING
SUPPLY
NOTE: 1/8"-27 NPT, LOADING & SUPPLY CONNECTIONS FOR CLASS A, 1/4"-18 NPT FOR CLASS P.
PANEL CUTOUT
TOP VIEW OF MTG. CLIP
1¼" MINIMUM CLEARANCE REQ'D.
MOUNTING CLIP ASSEMBLY (3 REQ'D)
HOLES AT TOP AND BOTTOM FOR ELECTRICAL WIRING.
TOP VIEW
5/16" MAX. PANEL THICKNESS.
PNEUMATIC RECEIVER UNIT
AMPLIFIER MOTOR UNIT
CUSTOMERS AIR CONNECTIONS.
NOTE: PNEUMATIC RECEIVER UNITS OR AMPLIFIER MOTOR UNITS MAY BE PLACED IN ANY COMBINATION OF POSITIONS.
REAR VIEW
ENTRANCE FOR CABLE CONNS. SEE TOP VIEW.
8½" CLEARANCE REQUIRED FOR REMOVAL OF UNITS. ADD REASONABLE CLEARANCE FOR SERVICE.
POWER SUPPLY TERMINALS.
ENTRANCE FOR CABLE CONNECTIONS. SEE TOP VIEW.
SIDE VIEW
RECOMMENDED HEIGHT OF CHART CENTER ABOVE FLOOR 5'-1".
FRONT VIEW

FIGURE 2 - Case Dimensions and Panel Mounting Dimensions, Type WM55A Recorder (or WM53A Indicator)

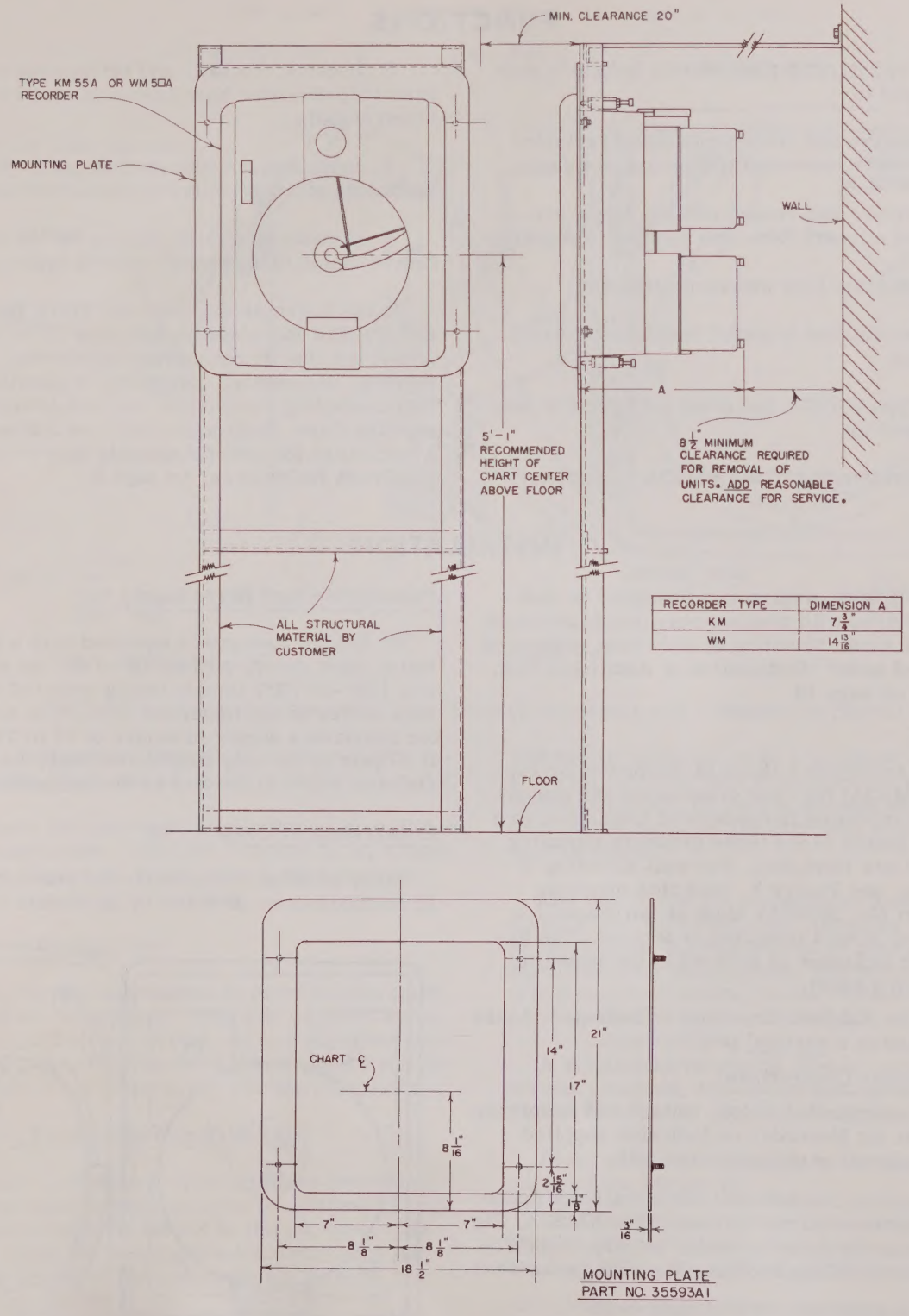



FIGURE 3 - Wall Mounting Dimensions, Type KM55A or WM55A Recorder (or, Type KM53A or WM53A Indicator)

## FUNCTIONS

The Type KM5□A Recorder or Indicator may be equipped to:

1. receive and record measured variables that have been converted to pneumatic signals;

2. receive and record certain direct pressures; and convert them into pneumatic signals;

3. integrate flow measurements and

4. develop and transmit loading or control pressures.

The Type WM5□A Recorder or Indicator may be equipped to:

1. perform any of the KM5□A's functions;

2. receive, record, and retransmit measured variables that have been converted to electrical signals;

3. compute quantities such as sums, products, and ratios of electrically retransmitted variables;

4. provide electrical signals for the operation of alarm or electrical control systems.

These Instructions cover the Types KM5□A and WM5□A Recorder or Indicator Case and accessories, but do not include information on receiving, integrating, computing, controlling, or retransmitting components that are housed inside the Case. Instruction Sections that apply to a particular Recorder Assembly may be noted in "Cross References" on page 2.

## INSTALLATION

The following applies to a Recorder or Indicator received with components already mounted within the case. Mounting of additional equipment is covered under "Installation of Additional Components" on page 12.

### Mounting

Refer to Figure 1 (KM5□A Recorder) or Figure 2 (WM5□A) for case dimensions and dimensions for mounting Recorders or Indicators on a panel by means of the three pressure mounting clips that are furnished. For wall mounting dimensions, see Figure 3. Note that mounting plate Part No. 35593A1 must be purchased (or fabricated) if wall mounting is desired. The Recorder or Indicator is secured to the mounting plate as to a panel.

NOTE: The KM/WM Recorder or Indicator should be mounted in a vertical position only.

### Power Supply Connections

Make certain that supply voltage and frequency is correct for Recorder or Indicator supplied (see "Explanation of Nomenclature").

Make power connections to terminal block inside protecting cover on back of case (Type KM5□A, Figure 1, rear view), or to center terminal block in wiring channel (Type WM5□A, Figure 2, rear view).

When a grounded power supply is used, connect grounded side to terminal marked GND. If grounding of Recorder or Indicator case is required, use grounding terminal provided inside bottom flange of wiring cover.

### Pneumatic Chart Drive Supply Air

On KM55A Recorders equipped with a pneumatic chart drive, connection to the air motor is a 1/8"-27 NPT female fitting mounted on the rear center of the Recorder Case. The air motor requires a supply pressure of 15 to 25 psig. If 30 psig is the only supply available, install a reducing valve in the line to the connection.

### Connections to Components

Make pneumatic and electrical connections to components as directed by applicable com-

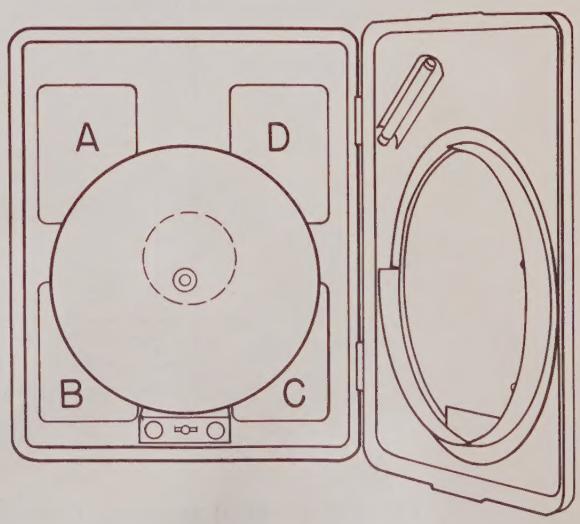



FIGURE 4 - Component Positions

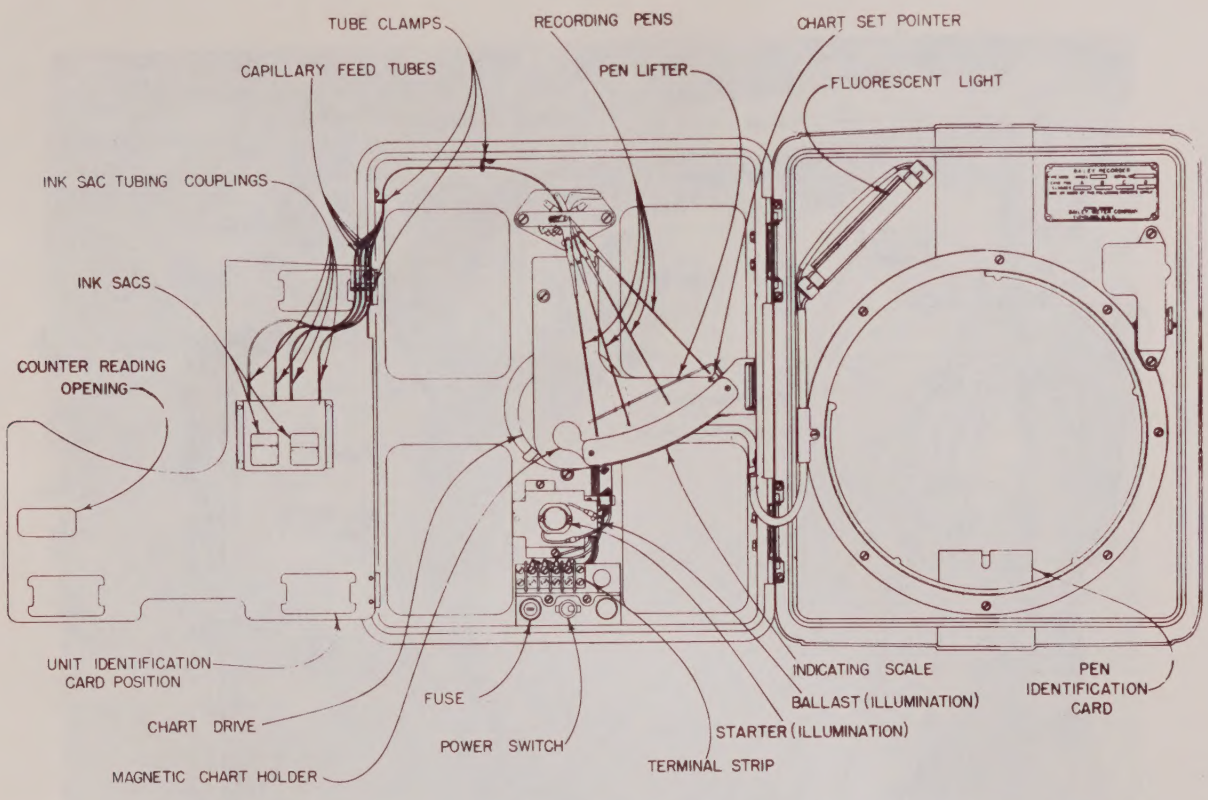



FIGURE 5 - Recorder Case with Four Pens (Components and Linkages not Shown)

ponent Instruction Sections elsewhere in this Instruction Book, and as shown in Figures 1 and 2.

There are four positions in the case available for components. They are lettered A, B, C and D (See Figure 4). Blank rear covers are provided for positions not used.

## Internal Illumination

If internal illumination is provided, the starter and the fluorescent lamp will be found at the bottom of the case carton, or in a separate carton with other accessories. See Figure 5 for the location of lampholder and starter receptacle.

## Placing Pens In Service (□M55A)

Refer to Figure 6. The capillary feed tubes are installed in the Recorder for shipment, connected to the pens but not to the ink sacs. The short length of tubing extending from each ink sac is sealed at the tip to prevent leakage.

After a pen is chemically cleaned at the factory, the pen tip is enclosed in a protective covering. This covering should not be removed until the pen is ready to be placed in service. The pen tip must never be touched by the fingers, since oil, grease, and skin particles may clog the tiny opening, or tend to prevent proper "wetting" of the metal by the ink, thus making the pen hard to start.

One sac of red ink normally is provided with a single pen Recorder. In a Recorder with two or more pens, a complete set of four ink sacs is supplied--red, blue, green, and purple-- permitting a choice of colors for the variables being recorded. Black ink is also available.

A small colored plastic sleeve, matching each ink sac provided, fits on the pen (as shown in Figure 6) to aid in use of the indicating scale.

Place each recording pen in service as follows (see Figure 7):

1. Open Recorder door and hinged chart plate. With hinged chart plate left open, place chart on chart spindle and engage magnetic chart holder.

2. Remove protective covering from tips of all pens, and place plastic sleeve of appropriate color on each pen, as shown in Figures 6 and 7. (Slide carefully over pen tip, so that tip does not scrape its inside surface.)

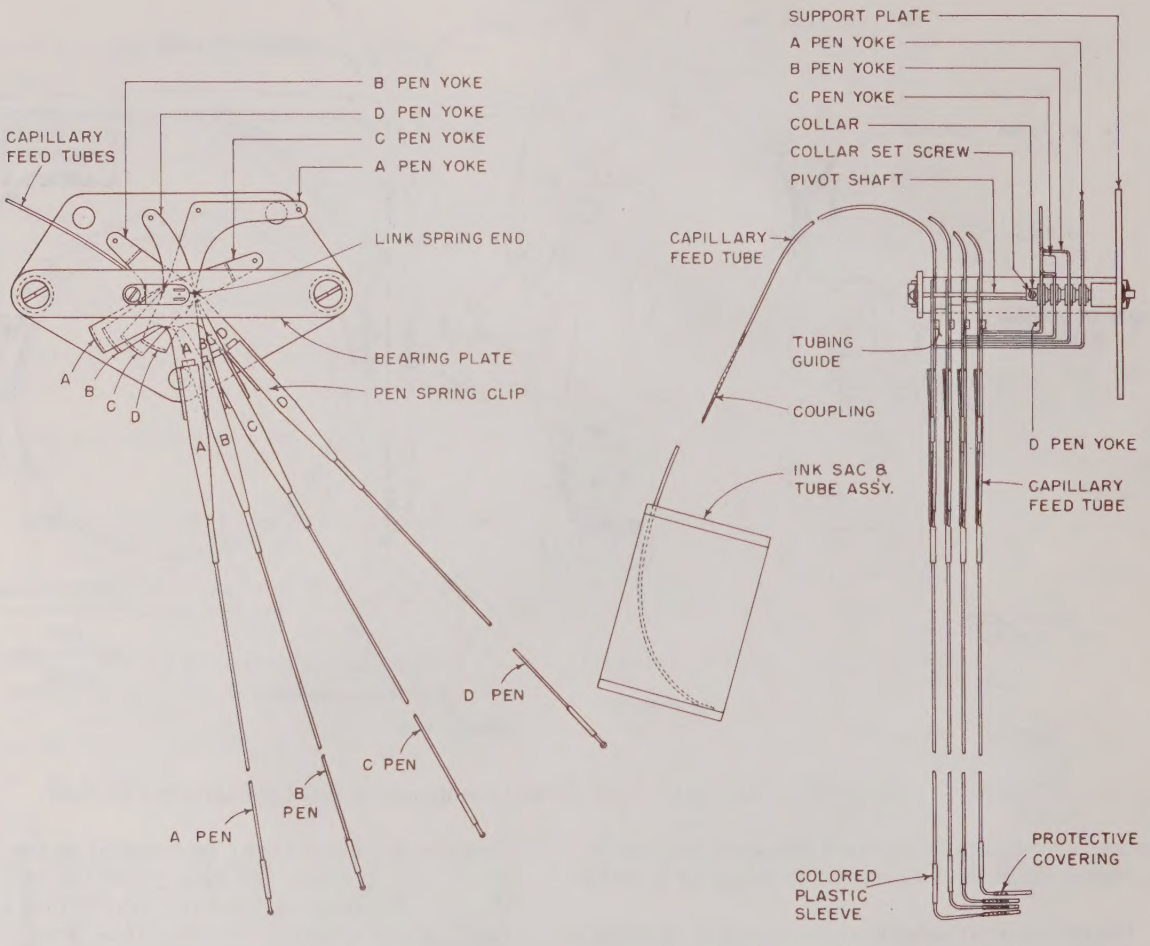



FIGURE 6 - Pen Assembly

3. Select first pen to be inked. Disconnect linkage from pen yoke as shown in Figure 10.

4. Sweep disconnected pen over full chart. Check for no interference with other pens, and that pressure of pen against chart is light but constant. If this check is unsatisfactory, carefully bend pen arm until it sweeps correctly.

5. Select ink sac to be used, and cut off sealed tip of protruding tubing with razor or sharp knife.

6. Connect pen to ink sac by inserting metal coupling (attached to free end of feed tubing) firmly into ink sac tubing. Use as much manual force as possible, to assure a tight connection.

7. Place ink sac in bracket on back of hinged chart plate. Make sure that tubing does not loop out from chart plate where it might interfere with the moving parts of the Recorder.

8. If Recorder has more than one pen, move disconnected pen up chart away from other pens, and secure by tying, taping, or blocking pen yoke.

9. Place a small piece of paper toweling under the pen tip.

10. Remove ink sac from bracket and squeeze sac to force ink thru feed tube to pen. Force ink out of pen until all air bubbles are removed from capillary tubing (see Figure 7).

11. Hang ink sac over top of chart plate, so it is above its normal position in the bracket. Remove paper toweling from beneath pen tip.

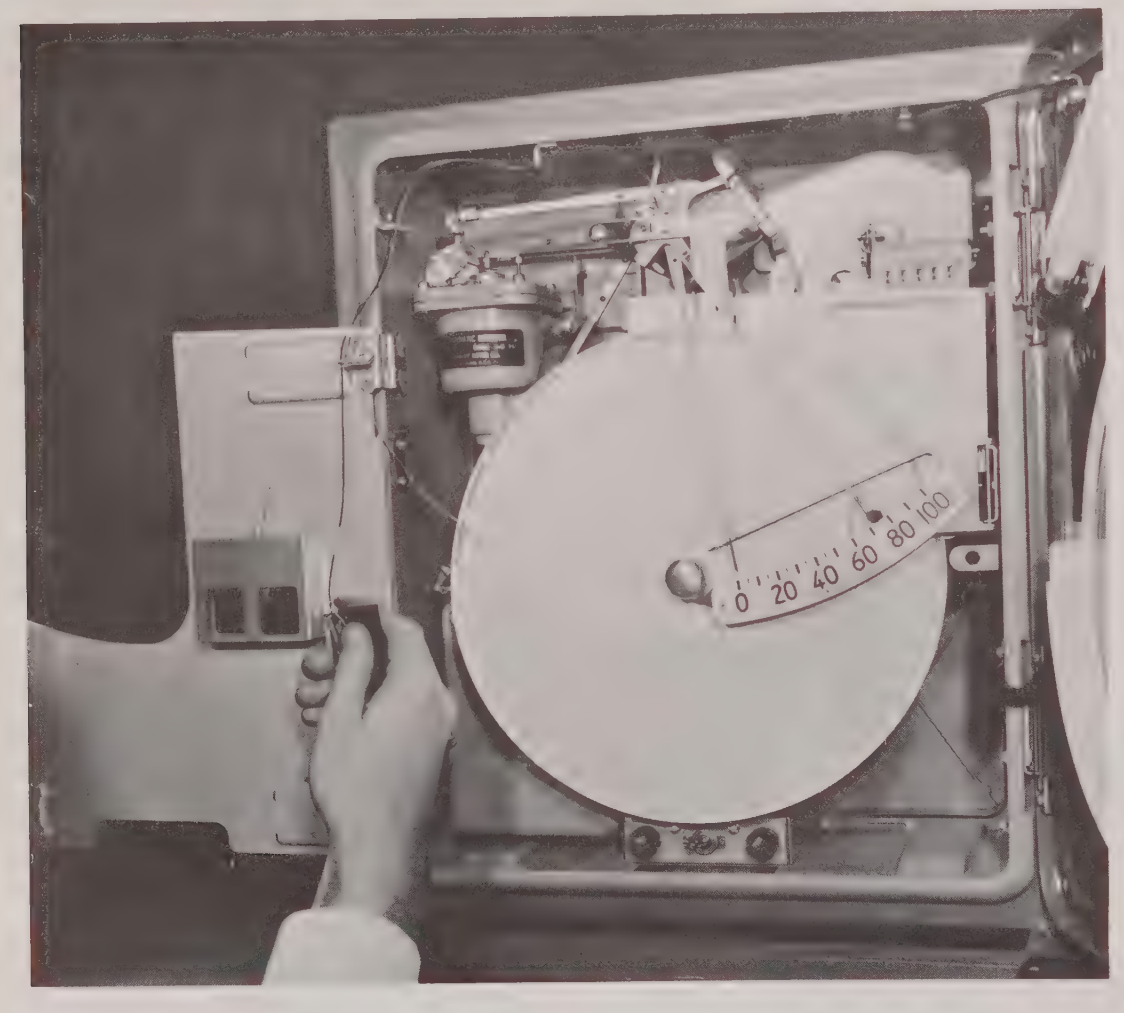



FIGURE 7 - Placing Pens in Service

Free the yoke and move pen back and forth over full chart ten or twelve times. This procedure starts the pen with a slight oversupply of ink.

12. Replace ink sac in bracket, and again move pen back and forth on the chart several times. It should be tracing satisfactorily.

13. Reconnect linkage to the pen yoke as shown in Figure 10.

14. Repeat steps 3 thru 13 for all additional pens.

15. Remove chart. With magnetic chart holder opened all the way out, and pens raised by automatic pen lifter, close hinged chart plate. Replace chart.

With Recorder door closed, observe chart thru door glass. To insure free motion of chart when in operation, the chart must be clear of chart ring (on door) thru its entire circumference and must be free of any tension from the four chart-ring tabs. If necessary, reposition the chart ring, and adjust door latch or bend the tabs to obtain the desired clearance.

If a pen does not ink immediately, or stops inking during its initial period of service, disconnect linkage to pen yoke and move pen rapidly up and down the chart. At the same time, squeeze ink sac to force ink out of pen. If pen is plugged and ink does not flow, hold a lighted match beneath pen tip and again squeeze ink sac. In extreme cases, the pen may have to be replaced (see "Maintenance", page 11).

Identification Cards

Fill in pen and unit identification cards provided with Recorder (Figure 8). The pen identification card, mounted in the Recorder window (see Figure 5), should have the pen service (STEAM FLOW, DRUM LEVEL, etc.) filled in beside each color used.

Unit identification cards are mounted on the front of the chart plate at each component position (Figure 5). Note the following when making entries:

1. chart factor - determined by dividing maximum range value by maximum chart reading. For example, if top value is 150,000 lb/hr and maximum chart reading is 150, the Indicators, chart factor = $\frac{150,000}{150}$ = 1000. For □M53A scale factor is shown on card, and is computed in the same manner as chart factor;

2. chart number - printed on chart;

3. integrator factor - when standard integrators (with standard change gears) are installed, divide maximum range value (of the flow being totalized) by 100. For example, if top value is 150,000 lb/hr the integrator factor = $\frac{150,000}{100}$ = 1500.

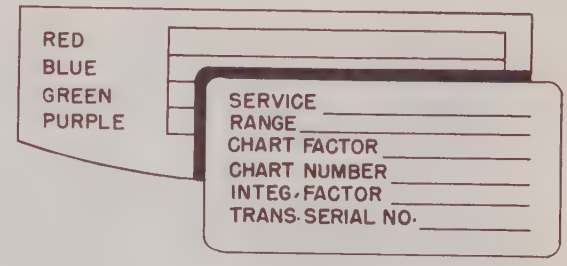



FIGURE 8 - Pen and Unit Identification Cards

For direct-reading integrators, divide maximum range value by its own first three digits. For example, if top value is 150,000 lb/hr the integrator factor = $\frac{150,000}{150}$ = 1000. Determination of integrator factor is covered in more detail in Instruction Section G92-1, Class Y Integrator.

4. transmitter serial number - found on transmitter nameplate. Note that this entry refers to instruments which transmit variables to the Recorder, and not to a Class P Transmitter that may be mounted in the Recorder Case.

## OPERATION

Refer to Figure 5. The Type □M55A Recorder Case is pictured with the hinged chart plate (which acts as an inner door) open to show the Case interior. The removable upper right-hand corner section of the chart plate is not shown.

Turn on the power switch to operate integrator and electric chart drive motors, light the fluorescent lamp, and operate the electronic components.

Spring-driven chart drives should be wound regularly: daily for drives with 8-hour or 12-hour rotation, and weekly for all others. Take care to avoid winding the spring too tightly, so that the mechanism will not be jammed.

To install a new chart, pull the magnetic chart holder from the chart spindle and open it out, so that the pens are raised by the automatic pen-lifter. Remove the old chart, and position the new chart on the spindle, with the correct time line under the chart set pointer. Replace the magnetic chart holder, which will anchor the chart on the spindle. When a chart is installed in this manner, the "A" pen record will match the time lines of the chart exactly.

# ADJUSTMENT AND CALIBRATION

## Components

Adjustment and calibration of pneumatic and electric components within a Recorder or Indicator are covered in the applicable component Instruction Sections listed under "Cross References" on page 2.

## Mechanical Chart Drive Adjustments (□M55A)

Remove viewing window from front of the chart drive, and move SLOW-FAST adjustment to retard or advance chart speed.

## Linkage Adjustments

Adjustable links are used in all linkages between components and recording pens or indicating pointers. Linkages to factory-installed components are set correctly at the factory, and should be readjusted only if the component goes out of calibration, and then only when directed by the component Instruction Section. Refer to Figure 9.

Coarse Adjustment - Loosen round-head screws and move slotted connecting link with respect to channel and variable link.

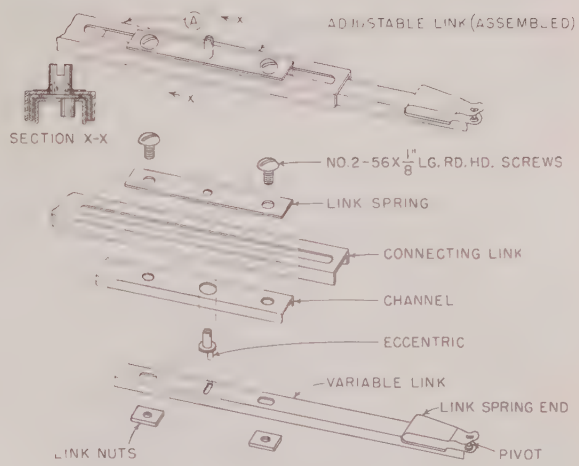



FIGURE 9 - Adjustable Link

NOTE: On factory installed components, coarse adjustments have been made and connecting links are crimped at point A, Figure 9. These adjustments cannot be changed.

Fine Adjustment - Loosen round-head screws slightly and turn eccentric to move variable link with respect to channel and connecting link. Maximum adjustment of ±1/32 inch is possible.

# MAINTENANCE

A minimum of routine maintenance is required. Keep case clean and door closed. Do not use Recorder or Indicator case as a storage cabinet.

Unless specifically instructed to do so, do not oil any moving parts of Recorder or Indicator or components. Oil, instead of improving action of moving parts, will cause them to stick and will interfere with their operation.

## Electric Chart Drives (□M55A)

If chart drive motor fails (turns very hard or stops completely), replace rotor unit. Check timing of chart drive. If timing is off, check rotor unit to see that it turns easily. Then check power supply voltage and frequency (must be held as close as possible to values appearing on motor nameplate).

Electrically driven chart movements require no lubrication.

## Mechanical Chart Drives (□M55A)

If mechanical chart drive does not start after winding, remove viewing window and touch balance wheel lightly. Continued failure to start usually means that drive is defective, and should be returned to Bailey Meter Company for repair or replacement.

Oil spring-driven chart drives every three to six months. Place a few drops of high grade watch oil on main shaft and winding shaft where they emerge from drive case. Care must be taken not to get too much oil in the drive, for an excessive amount collects dirt and causes sluggish operation.

Do not wind the spring too tightly. A tightly wound main spring is often the reason that a drive refuses to start or to operate continuously.

### Pneumatic Chart Drives (KM55A)

Movements of pneumatic chart drives are designed for self-starting at about 10 psig. If a unit fails to start when air is first applied, shut off the air line for a few moments and then apply air again.

Movements are furnished lubricated with Nye's clock oil, applied to recesses in plates at shaft pivot ends and to teeth of escape wheel. Relubricate at least once each year, and clean and lubricate every two years. Nye's clock oil can be obtained from the Bailey Meter Company (Part No. 19904A1/4).

Check movements every few months for moisture, oil, and foreign particles, to assure that supply air is being filtered properly.

### Recording Pens (□M55A)

To keep pens from clogging, periodically (every 30 days or so) hold a paper towel under pen tip, and squeeze ink sac to flush ink thru pen.

If a pen becomes clogged, try to clear it by flushing ink thru it. If pen cannot be cleared by squeezing ink sac while a lighted match is held beneath pen tip, both pen and ink sac should be replaced.

If a pen is clear (ink drips when ink sac is squeezed), yet does not draw a line while touching the chart with normal pressure, a film of ink is not forming on the tip (ink is not "wetting" the metal). To correct this condition, either:

1. hang ink sac over hinged chart plate so that the sac is higher than it was in the bracket, disconnect linkage to pen yoke, and exercise pen back and forth across a chart rapidly and repeatedly; or

2. tape ink sac three inches or so above normal level, and allow Recorder to operate with ink sac in this position for several hours.

To remove a pen, slip capillary feed tube from the tube clamps (Figure 4), disengage the pen by lifting pen spring clip out of its slot in pen yoke (Figure 5), and slide pen off yoke. Disconnect feed tube from pen.

To replace a pen, insert tapered upper end of pen firmly in capillary feed tube. Take care not to buckle tube. Then slide pen on pen yoke until pen spring clip is firmly seated. Check that clip is well down in the slot, and does not interfere with adjacent pen's feed tube as the pens pass each other. Replace feed tube in tube clamps. Start the pen as described in "Placing Pens in Service", page 7.

### Ink Sacs

Each sealed plastic ink sac contains about one year's supply of ink. When almost dry, replace with new Ink Sac and Tube Assembly (Parts Drawing G92-21). Remove old Ink Sac and Tube Assembly from metal coupling and install new Assembly as outlined under "Placing Pens in Service".

## INSTALLATION OF ADDITIONAL COMPONENTS

Additional components may be ordered and installed in the Recorder quickly and easily. Specific instructions for installing the various classes of components are given in special drawings which are shipped with these units.

### Installing Adjustable Links

When additional components are ordered, adjustable links will be included in the component kits. These links are suitable for one component position only (Figure 4), and will be marked with an identifying letter, as specified in the Instruction Section for the component.

1. Loosen round-head screw(s) and turn eccentric until variable link is in mid-point of its fine adjustment travel.

2. Make coarse adjustment by moving slotted connecting link with respect to channel and variable link. Then, partially tighten the round-head screw(s), so that eccentric still can be turned.

3. Make fine adjustment, if necessary, by turning eccentric, which can move the variable link up to 1/32 inch in either direction.

4. When adjustment is final, tighten the round-head screw(s).

### Installing Additional Pens Or Pointers

Figure 5 shows a pen assembly complete with four pens. Note that there is a specific pen and pen yoke for each component position (A thru D). The pen yokes are mounted, one inside the other,

on the pivot shaft and are held in position by the collar. If an additional pen must be added to the Recorder, the original pen yokes must be removed from the shaft and then reassembled with the new pen yoke in position. For Indicators, when adding a pointer, perform only steps 2 thru 7 below. Substitute the word "pointer" for pen, as required in this procedure. Proceed as follows:

1. Remove capillary feed tubes from tube clamps (Figure 5).

2. Remove each pen from its pen yoke by lifting spring clip out of its recess and sliding pen off yoke.

3. Loosen collar set screw.

4. Turn link spring end off pivot shaft and, while holding collar and yokes with one hand, pull pivot shaft out thru bearing plate.

5. Place additional yoke in position, and reinsert pivot shaft thru bearing plate, yokes, and collar, and into support plate bearing.

6. Turn link spring end into position over the end of the pivot shaft.

7. Push pen yokes and collar back on pivot shaft against rear bearing, leaving sufficient clearance for free rotation of each pen yoke. Tighten collar set screw

8. Connect new length of capillary feed tubing to new pen.

9. Slide each pen all the way on its pen yoke, making sure pen spring clip seats firmly in its slot. Check that adjacent feed tubes and spring clips clear each other when pens pass.

10. Place feed tubes in tube clamps.

11. Connect new feed tube to its ink sac and start the new pen as outlined in "Placing Pens in Service", page 7.

## Conversion of Type KM5□A to Type WM5□A

An Electronic Recorder or Indicator component can be added to a Type KM5□A Unit by ordering the component plus a kit (Part No. 667157-1) that will convert the instrument to a Type WM5□A Electronic Recorder or Indicator. The conversion kit provides a vertical wiring channel that fits on the rear of the Recorder Case. This channel contains power sockets and terminal strips for connection of electrical components. An instruction sheet included in the kit gives all the information required to make the conversion.

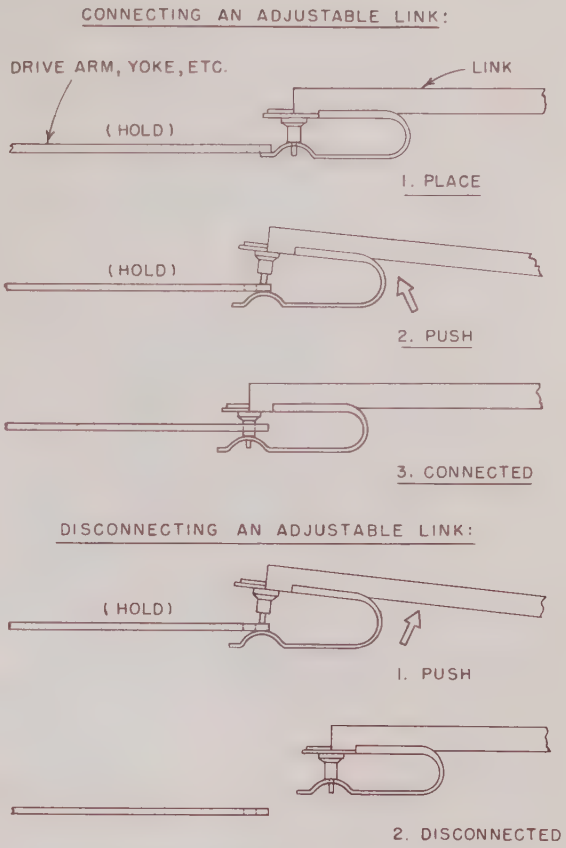



FIGURE 10 - Connection and Disconnection of Linkage

## Addition Of Internal Illumination

A kit is available for the addition of internal illumination to the Recorder or Indicator. (For 60 cycles, Part No. 35665-1; for 50 cycles, Part No. 35665-2.) Install as specified in the instruction sheet included in the kit.

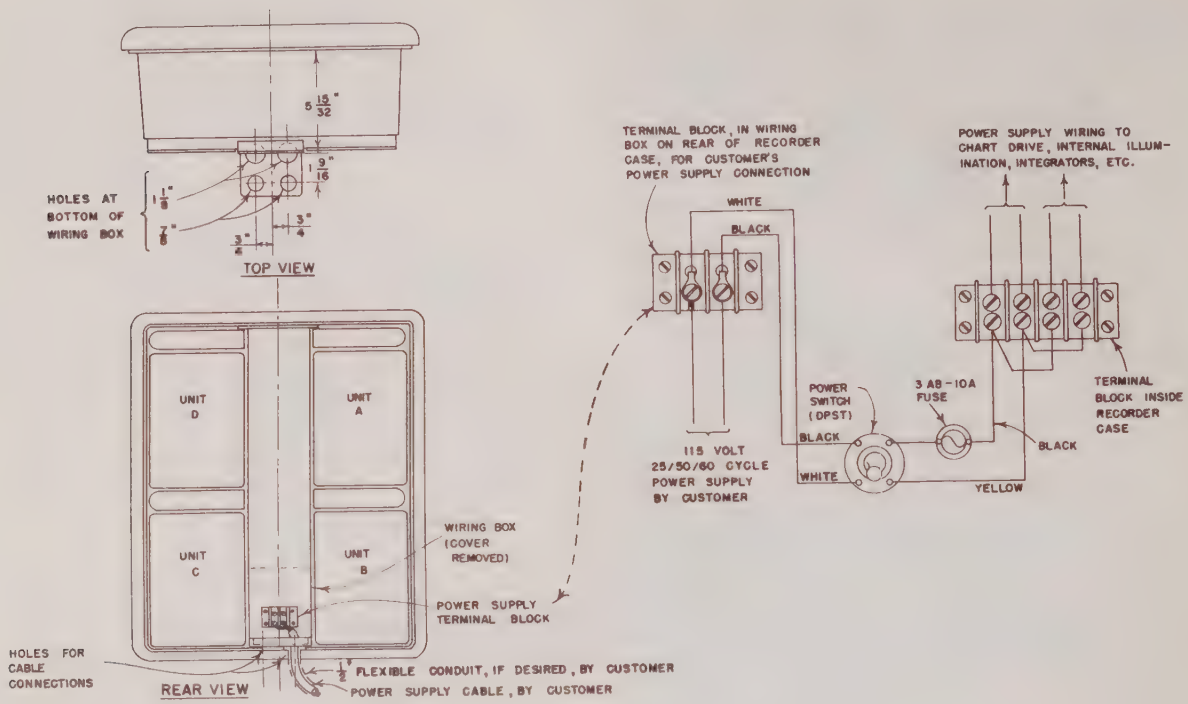



FIGURE 11 - Schematic Wiring Diagram of Power Circuit, Type KM55 Recorder or KM53 Indicator

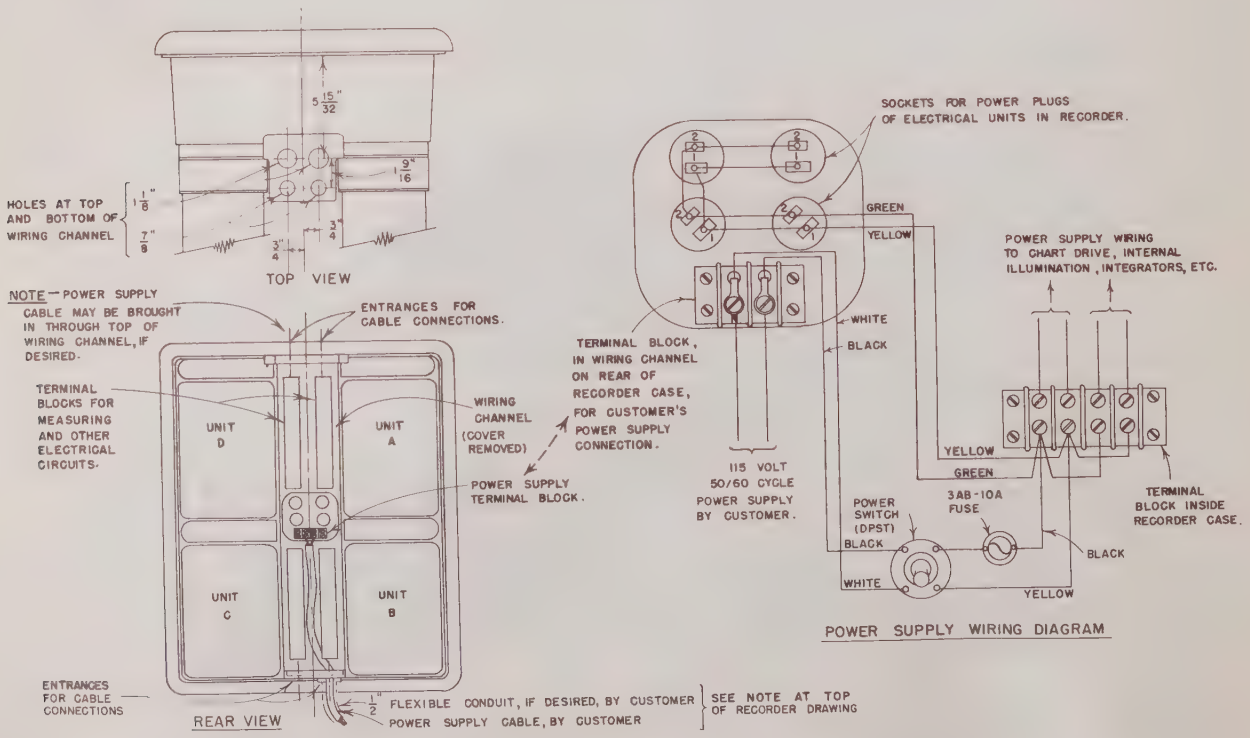



FIGURE 12 - Schematic Wiring Diagram of Power Circuit, Type WM55 Recorder or WM53 Indicator

# REPLACEMENT PARTS

## Spare Parts Kits

The Spare Parts Kits tabulated on Parts Drawings E12-41, G92-21, and G92-11 (Figures 13, 14, and 15) and below, should be carried in stock. Specify the Spare Parts Kit part number to order a complete kit. Refer also to "Ordering Individual Parts" below.

## Ordering Individual Parts

Parts Drawings for Type KM5□A and WM5□A Recorders are shown in Figures 13, 14, and 15. These drawings normally will apply to the Recorders furnished. However, there may be individual differences in specific Recorders because of:

a. Design changes made since the printing of this Instruction Section.

b. Special design of the Recorder or Indicator furnished, to make it suitable for a special application.

Therefore, when ordering parts, assure the receipt of correct replacements for the Recorder or Indicator furnished by specifying on the order:

1. Type, Model, Classes, and Serial Number of the Recorder for which parts are desired.

2. The Parts Drawing on which each part is illustrated. (The Parts Drawing Number is given in the title for the Figure.)

| COMPONENT | MODEL NO. | SPARE PARTS KIT PART. NO. | PARTS DWG. NO. |
|---|---|---|---|
| Recording Mechanism, including 24 Hour Chart Drive | E100, E101<br>E200, E201<br>E300<br>M100, M101 | 252000-1<br>252000-2<br>252000-3<br>252000-4 | (Fig. 15) G92-11 |
| Fluorescent Internal Illumination | E□1, M□1, P□1 | 250001-1 | (Fig. 13) E12-41 |

Parts Included In Spare Parts Kits:

| KIT PT. NO. | QUAN. | PT. NO. | NAME |
|---|---|---|---|
| 252000-1 (See Note) | 1 | 194235-1 | Field Coil |
| | 1 | 194997-1 | Rotor Unit |
| | 1 | 35416-1 | Chart Drive Mechanism |
| 252000-2 (See Note) | 1 | 194235-1 | Field Coil |
| | 1 | 194997-2 | Rotor Unit |
| | 1 | 35416-9 | Chart Drive Mechanism |
| 252000-3 (See Note) | 1 | 194235-2 | Field Coil |
| | 1 | 194997-5 | Rotor Unit |
| | 1 | 35416-17 | Chart Drive Mechanism |
| 252000-4 (See Note) | 1 | 35423-1 | Chart Drive Mechanism |
| 250001-1 | 1 | 194834-2 | Starter Switch |
| | 1 | 1941568-1 | Fluorescent Lamp |

NOTE: Spare Parts Kits Part No. 252000-□ also include the following common parts:

| QUAN. | PT. NO. | NAME |
|---|---|---|
| 2 | 194776-5 | Fuse |
| 1 | 35337-1 | Red Ink Sac and Tube Assy. |
| 1 | 35337-2 | Blue Ink Sac and Tube Assy. |
| 1 | 35337-3 | Green Ink Sac and Tube Assy. |
| 1 | 35337-4 | Purple Ink Sac and Tube Assy. |
| 1 | 35337-5 | Black Ink Sac and Tube Assy. |
| 1 | 35583-1 | Ink Sac Tubing Coupling |

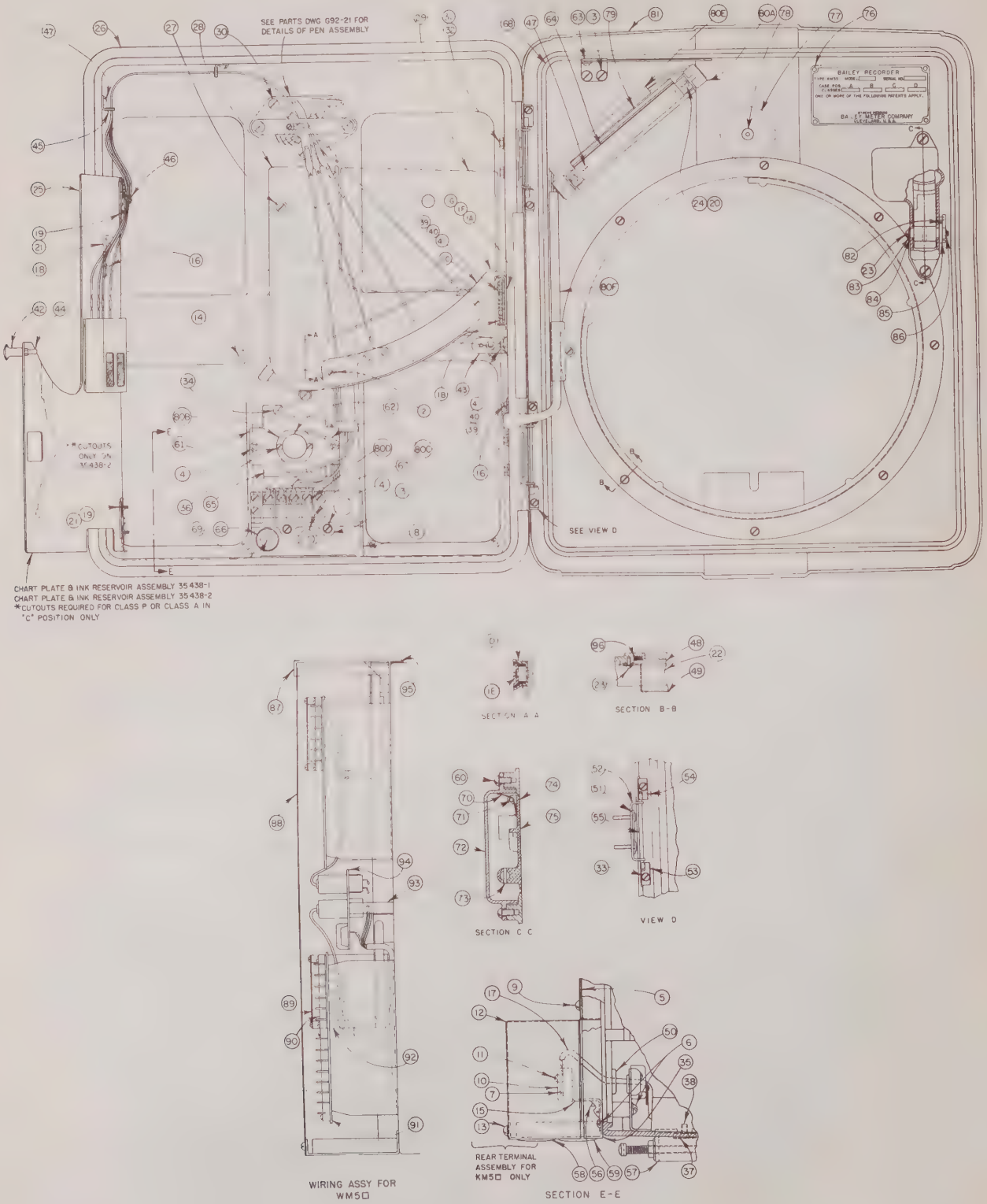

SEE PARTS DWG G92-21 FOR DETAILS OF PEN ASSEMBLY
BAILEY RECORDER
SEE VIEW D
*CUTOUTS ONLY ON 35438-2
CHART PLATE & INK RESERVOIR ASSEMBLY 35438-1
CHART PLATE & INK RESERVOIR ASSEMBLY 35438-2
*CUTOUTS REQUIRED FOR CLASS P OR CLASS A IN "C" POSITION ONLY
SECTION A-A
SECTION B-B
SECTION C-C
VIEW D
WIRING ASSY FOR WM5□
REAR TERMINAL ASSEMBLY FOR KM5□ ONLY
SECTION E-E

FIGURE 13 - Parts Drawing E12-41,

LIST OF PARTS

| ITEM NO. | PART NO. | NAME |
|---|---|---|
| 1 | 35743-1 | SCALE SUPPORT & HINGE ASSY, INCLUDES: |
| 1A | 35370-1 | HINGE BRACKET |
| 1B | 35495-1 | HINGE PIN |
| 1C | 35373-1 | SCALE SUPPORT |
| 1D | 35421-1 | MAGNET ASSY |
| 1E | 35323-1 | RETAINING WASHER |
| 1F | 6-32 X 1/2 | HEX RECESS HD SCREW |
| 1G | 6-32 | HEX NUT |
| 2 | 3-48 X 1/8 | RD HD SCREW |
| 3 | 35455-1 | SWITCH & FUSE COVER |
| 4 | 6-32 X 3/16 | RD HD INT SEMS |
| 5 | 35320-1 | COVER |
| 6 | 10-32 X 3/8 | RD HD INT SEMS |
| 7 | 6-32 X 7/16 | RD HD MACH SCREW |
| 8 | 35480-1 | SWITCH & FUSE BRACKET ASSY |
| 9 | 10-32 X 7/8 | RD HD INT SEMS |
| 10 | 194956-2 | TERMINAL STRIP |
| 11 | 6-32 X 5/8 | RD HD MACH SCREW |
| 12 | 35459-1 | COVER ASSY |
| 13 | 10-32 X 1/4 | RD HD INT SEMS |
| 14 | 10-32 X 5/8 | FIL HD SCREW |
| 15 | 35458-1 | TERMINAL BLOCK BRACKET |
| 16 | 10-32 X 3/16 | RD HD SCREW |
| 17 | 35754-1 | WIRING CABLE ASSY |
| 18 | 35284-1 | CASE LATCH |
| 19 | 6-32 X 5/16 | FILLISTER HD SCREW |
| 20 | 1206 | INT. LOCKWASHER |
| 21 | #C-8093-632-67 "U" TYPE SPEED NUT | 4 REQ |
| 22 | 351003-□ | DOOR MASK, SEE TABLE |
| 23 | 6-32 X 1/4 | RD HD EXT SEMS |
| 24 | 6-32 X 3/16 | PAN HD SCREW |
| 25 | SEE TABLE | INNER DOOR |
| 26 | 35310-1 | RECORDER CASE |
| 27 | 66841-1 | BINDING HD SCREW 5 REQ |
| 28 | SEE TABLE | CENTER PLATE |
| 29 | 35386-1 | CHART PLATE CORNER SECTION ASSY |
| 30 | 10-32 X 3/8 | PAN HD SCREW 3 REQ |
| 31 | 1106-00 | EXT LOCKWASHER |
| 32 | 6-32 | HEX NUT |
| 33 | 6-32 X 1/4 | RD HD INT SEMS |
| 34 | | |
| 35 | 35407-1 | LOWER CONN FLANGE |
| 36 | 4-40 X 1/4 | RD HD SCREW |
| 37 | 35325-1 | MTG CLIP WASHER 3 REQ |
| 38 | 10-32 X 7/16 | FLAT HD SCREW |
| 39 | 1208 | INT LOCKWASHER |
| 40 | 8-32 | HEX NUT |
| 41 | 8-32 X 5/16 | FLAT HD SCREW |
| 42 | 35503-1 | KNOB |
| 43 | 35506-1 | LATCH BRKT ASSY |
| 44 | 35508-1 | CHART PLATE BALL STUD |
| 45 | 35556-1 | PEN TUBE CLAMP ASSY, SEE TABLE, 2 REQ |
| 46 | 35556-2 | PEN TUBE CLAMP ASSY, SEE TABLE |
| 47 | 6-32 X 3/16 | RD HD SCREW |
| 48 | NO. 130 | METER DOOR GLASS |
| 49 | SEE TABLE | CLAMP RING |

| ITEM NO. | PART NO. | NAME |
|---|---|---|
| 50 | 67125-5 | RUBBER GROMMET |
| 51 | 35482-1 | MTG PLATE & WELDED BOLT ASSY, 2 REQ |
| 52 | 35294-1 | HINGE BRKT, 2 REQ |
| 53 | 35291-1 | HINGE PIN CLAMP, 2 REQ |
| 54 | 35291-2 | HINGE PIN CLAMP, 2 REQ |
| 55 | 35302-1 | HINGE PIN, 2 REQ |
| 56 | 197160-1 | WIRE TERMINAL |
| 57 | 35652-1 | MOUNTING CLIP ASSY, 3 REQ |
| 58 | 19981-6 | PLUG BUTTON, 2 REQ |
| 59 | 19981-3 | PLUG BUTTON, 2 REQ |
| 60 | 10-32 X 5/16 | RD HD EXT SEMS |
| 61 | 35456-1 | BALLAST & STARTER BRKT |
| 62 | 194834-2 | STARTER SWITCH |
| 63 | 35464-1 | STOP LINK PIVOT & BRKT ASSY |
| 64 | 1941568-1 | FLUORESCENT LAMP BULB |
| 65 | 194783-3 | BALLAST |
| 66 | 1941504-1 | FUSE HOLDER, 1 REQ |
| 67 | 1941021-1 | POWER SWITCH |
| 68 | 35288-1 | RUBBER SEALING STRIP |
| 69 | 194776-11002 | FUSE, 1 REQ |
| 70 | 35462-1 | LATCH SPRING |
| 71 | 35289-1 | HINGE PIN |
| 72 | 35283-1 | COVER |
| 73 | 3/32 D X 1/2 | ROLL PIN |
| 74 | 35301-1 | COVER |
| 75 | 35296-1 | HANDLE |
| 76 | NO. 2 | KALON DRIVE SCREW, 4 REQ |
| 77 | 196926-1 | TRADE MARK |
| 78 | 197248-1 | SPEED NUT |
| 79 | 35418-1 | LAMP BRACKET |
| 80 | 35871-1 | KM & WM ILLUMINATING REPAIR KIT, INCLUDES: |
| 80A | 1941346-1 | LAMP HOLDER |
| 80B | 1941547-1 | STARTER SOCKET |
| 80C | 1941566-1 | WIRE CONNECTOR, 2 REQ |
| 80D | 1941520-1 | AUTO STRIP SPADE TERMINAL |
| 80E | NO. 6 | BM CO. IRVOLITE TUBING, 5" REQ |
| 80F | NO. 11 | INSULATION TUBING, 28" REQ |
| 81 | 35282-1 | DOOR |
| 82 | 35297-1 | DOOR LATCH |
| 83 | NO 6 | WASHER |
| 84 | 35305-1 | NYLON WASHER |
| 85 | 35463-1 | ECCENTRIC SHAFT & GROOV PIN ASSY |
| 86 | 197164-18 | RETAINING RING |
| 87 | 35398-1 | TOP CONN. FLANGE |
| 88 | 35368-1 | WIRING CHANNEL COVER ASSY |
| 89 | 66 6363-1 | DESIGNATION PLATE ASSY |
| 90 | 1941529-5 | TERMINAL BLOCK |
| 91 | 35326-1 | TERMINAL BLOCK SUPPORT |
| 92 | 667238-1 | FANNING STRIP |
| 93 | 35475-1 | SOCKET & TERMINAL SUPPORT SPACER |
| 94 | 35479-1 | SOCKET & TERMINAL SUPPORT ASSY |
| 95 | 35397-1 | FLANGE GASKET |
| 96 | 311304-12 | CORK SEALING STRIP |

TABLE

| | DOOR MASK ITEM 22 | INNER DOOR ITEM 25 | CENTER PLATE ITEM 28 | PEN TUBE CLAMP ASSY ITEM 45 | PEN TUBE CLAMP ASSY ITEM 46 | CLAMP RING ITEM 49 | | |
|---|---|---|---|---|---|---|---|---|
| TYPE KM53, WM53 | 351003-□ | 351021-1 | 351005-1 | OMIT | OMIT | 35306-2 | | |
| TYPE KM55, WM55 | OMIT | 35438-□ | 35494-1 | 35556-1 | 35556-2 | 35505-1 | | |

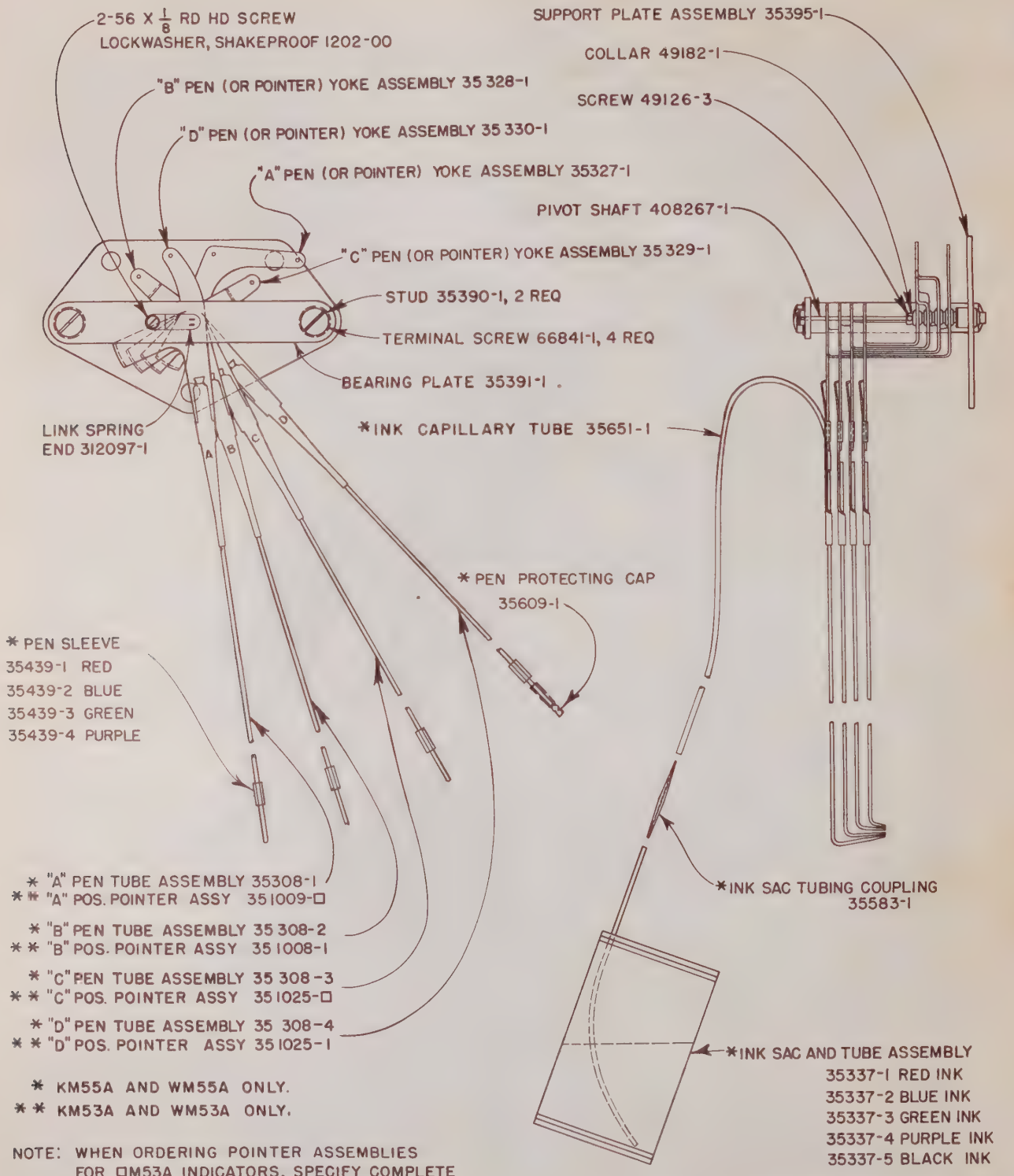

2-56 X 1/8 RD HD SCREW
LOCKWASHER, SHAKEPROOF 1202-00
"B" PEN (OR POINTER) YOKE ASSEMBLY 35328-1
"D" PEN (OR POINTER) YOKE ASSEMBLY 35330-1
"A" PEN (OR POINTER) YOKE ASSEMBLY 35327-1
"C" PEN (OR POINTER) YOKE ASSEMBLY 35329-1
STUD 35390-1, 2 REQ
TERMINAL SCREW 66841-1, 4 REQ
BEARING PLATE 35391-1
LINK SPRING END 312097-1
SUPPORT PLATE ASSEMBLY 35395-1
COLLAR 49182-1
SCREW 49126-3
PIVOT SHAFT 408267-1
*INK CAPILLARY TUBE 35651-1
* PEN PROTECTING CAP 35609-1
* PEN SLEEVE
35439-1 RED
35439-2 BLUE
35439-3 GREEN
35439-4 PURPLE
* "A" PEN TUBE ASSEMBLY 35308-1
** "A" POS. POINTER ASSY 351009-□
* "B" PEN TUBE ASSEMBLY 35308-2
** "B" POS. POINTER ASSY 351008-1
* "C" PEN TUBE ASSEMBLY 35308-3
** "C" POS. POINTER ASSY 351025-□
* "D" PEN TUBE ASSEMBLY 35308-4
** "D" POS. POINTER ASSY 351025-1
* KM55A AND WM55A ONLY.
** KM53A AND WM53A ONLY.
NOTE: WHEN ORDERING POINTER ASSEMBLIES FOR □M53A INDICATORS, SPECIFY COMPLETE NOMENCLATURE LISTED ON CASE NAMEPLATE MOUNTED ON CASE DOOR.
*INK SAC TUBING COUPLING 35583-1
*INK SAC AND TUBE ASSEMBLY
35337-1 RED INK
35337-2 BLUE INK
35337-3 GREEN INK
35337-4 PURPLE INK
35337-5 BLACK INK
IT IS NOT RECOMMENDED THAT ANY ATTEMPT BE MADE TO REFILL THE INK SAC.

FIGURE 14 - Parts Drawing G92-21, Pen or Pointer Assembly

| 115V ELECTRIC CHART DRIVE MECHANISM | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 Rev. In | Complete Chart Drive | | | Replacement Rotor | | | Replacement Coil | | |
| | 60 Cycle | 50 C | 25 C | 60 Cycle | 50 C | 25 C | 60 Cycle | 50 Cycle | 25 Cycle |
| 24 Hrs. | 35416-1 | -9 | -17 | 194997-1 | -2 | -5 | 194235-1 | 194235-1 | 194235-2 |
| 12 Hrs. | 35416-2 | -10 | -18 | | | | | | |
| 8 Hrs. | 35416-3 | -11 | -19 | | | | | | |
| 48 Hrs. | 35416-4 | -12 | -20 | | | | | | |
| 4 Min. | 35416-5 | -13 | -21 | 1941163-1 | -2 | -3 | | | |
| 24 Min. | 35416-6 | -14 | -22 | | | | | | |
| 96 Min. | 35416-7 | -15 | -23 | 194997-1 | -2 | -5 | | | |
| 7 Day | 35416-8 | -16 | -24 | | | | | | |

Note: For cam drive mechanism for Program Controller, Class TA, see Parts Drawing E99-65 in Instruction Section E99-71.

| Mechanical Chart Drives | | | Pneumatic Drives |
|---|---|---|---|
| 1 Rev. In | Part No. | Wind Period | Part No. |
| 24 Hrs. | 35423-1 | 9 Day | 35675-1 |
| 12 Hrs. | 35423-2 | 24 Hr. | 35675-2 |
| 8 Hrs. | 35423-3 | 24 Hr. | 35675-3 |
| 48 Hrs. | 35423-4 | 9 Day | 35675-4 |
| 7 Day | 35423-5 | 9 Day | 35675-5 |

FIGURE 15 - Parts Drawing G92-11, Chart Drives

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Reprint 11/30/79

# Bailey Control Systems

Instruction Supplement
E12-3

## Instruction Revision Sheet

This Instruction Revision applies to the Type WM5□A Recorder/Indicator and must be used with Product Instruction E12-3.

Replace the section titled "Power Supply Connections" under "Installation" on page 6 with the following section.

POWER SUPPLY CONNECTIONS

Make certain that supply voltage and frequency is correct for Recorder or Indicator supplied (see "Explanation of Nomenclature").

Make power connections to terminal block inside protecting cover on back of case (Type KM5□A, Figure 1, rear view), or to center terminal block in wiring channel on back of case (Type WM5□A, Figure 2, rear view).

The power supply "neutral conductor" is connected to the "N" terminal of the power supply terminal block. To assure operator safety and electrical code installation compliance, the WM5□A Recorder/Indicator must be "effectively grounded". The equipment grounding conductor is connected to the green grounding screw provided in the wiring channel below the power supply terminal block.

Form IS-E12-3 Litho in U.S.A. 1079

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